PCT WORLD INTELLECTUAL PROPERTY ORGANIZATION
International Bureau

INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification 4 : A43B 13/20 — A1

(11) International Publication Number: WO 90/00021

(43) International Publication Date: 11 January 1990 (11.01.90)

(21) International Application Number: PCT/HU89/00032

(22) International Filing Date: 28 June 1989 (28.06.89)

(30) Priority data:
3264/88 28 June 1988 (28.06.88) HU

(71) Applicant *(for all designated States except US)*: INNO-KER INNOVÁCIÓS-VÁLLALKOZÁSI ÉS KERESKEDELEMSZERVEZÉSI KISSZÖVETKEZET [HU/HU]; Tájék u. 1, H-1112 Budapest (HU).

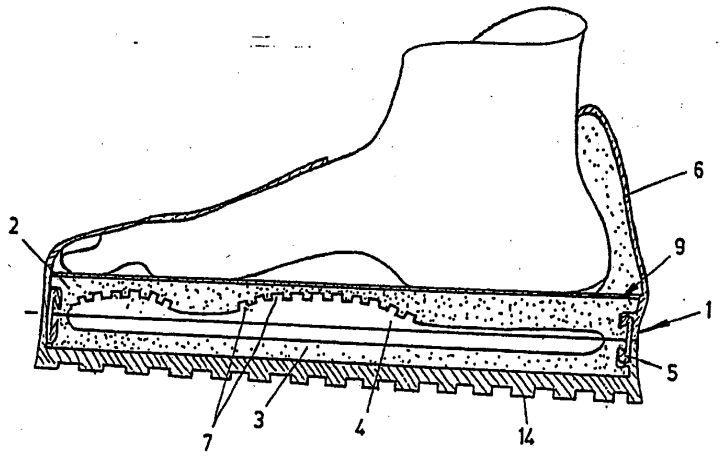
(72) Inventors; and
(75) Inventors/Applicants *(for US only)* : SZENTES, Ferenc [HU/HU]; Széchenyi emlék út 29, H-1121 Budapest (HU). SOMORJAI, Imre [HU/HU]; Kikelet u. 14, H-1125 Budapest (HU). ZUBONYAI, Ferenc [HU/HU]; Váczi Mihály u. 22, H-2083 Solymár (HU).

(74) Agent: PATENTBUREAU DANUBIA; P.O. Box 198, H-1368 Budapest (HU).

(81) Designated States: AT (European patent), AU, BE (European patent), BG, CH (European patent), DE (European patent), DK, FI, FR (European patent), GB (European patent), IT (European patent), JP, KP, KR, LU, LU (European patent), MC, NL (European patent), NO, RO, SE (European patent), US.

Published
With international search report.

(54) Title: FOOTWEAR



(57) Abstract

The invention relates to a footwear, having a sole-part (1) made of some flexible material and formed with a double layer, so an upper layer (2) and a lower layer (3). Between the two layers there is a space forming a closed cavity (4), which is filled with a material of the liquid state. The double sole (1) of the footwear forms a closed, not-divided cavity (4) extending in the full length of the sole (1), while at least one of the double layers has a thicker and/or harder layer on the points of force arising in course of the static and/or dynamic load of the sole (1) of the foot, expendiently in the environment of the heel, striated musculature and toe pads, additionally, at least on one of said double layers, partly or completely, there are deflecting ribs (8) and notches (7) promoting or preventing the flow of the enclosed inflexible material of liquid phase according to a predetermined order.

FOR THE PURPOSES OF INFORMATION ONLY

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

AT	Austria
AU	Australia
BB	Barbados
BE	Belgium
BF	Burkina Faso
BG	Bulgaria
BJ	Benin
BR	Brazil
CF	Central African Republic
CG	Congo
CH	Switzerland
CM	Cameroon
DE	Germany, Federal Republic of
DK	Denmark
ES	Spain
FI	Finland
FR	France
GA	Gabon
GB	United Kingdom
HU	Hungary
IT	Italy
JP	Japan
KP	Democratic People's Republic of Korea
KR	Republic of Korea
LI	Liechtenstein
LK	Sri Lanka
LU	Luxembourg
MC	Monaco
MG	Madagascar
ML	Mali
MR	Mauritania
MW	Malawi
NL	Netherlands
NO	Norway
RO	Romania
SD	Sudan
SE	Sweden
SN	Senegal
SU	Soviet Union
TD	Chad
TG	Togo
US	United States of America

FOOTWEAR

The invention relates to a footwear having two soles lying above each other, while two layers enclose a cavity containing a predetermined medium.

Healthy people are staying in the most part of their working time, the more, during their free-time and while changing the position, arising weight is transferred in its entirety to the feet, as a consequence, a most important requirement lies in that the foot should wear a footwear, which accomodates optimally to the peculiar features of the foot in any given position.

A properly designed footwear does not only treat carefully the foot itself, but exerts an advantageous influence onto the ankle, knees, load on joints, spinal column, the neck and the enclosing muscles. In technical literature dealing with sanitary matters several data stay at disposal clearing the reasons of locomotor diseases which can be led back to wearing inproper footwear, so e.g. wearing inproper footwear may cause even vascular diseases.

The foot of people, mainly the whole leg, is subjected considerably to dynamic load in course of running, mainly in course of any sporting activity.

Magnitude of the load having been exerted onto the foot resp. leg depends mainly of the process of load transfer. If load is transferred onto the foot within a short time, in a shock-like manner, the effect may be harmful for the foot, leg and joints. Such a process of load transfer is taking place, when somebody is running on a hard soil, or wearing some footwear with a hard sole and running with an unproportionally high speed. Medical practice leads back sudden occurence of vascular diseases to dynamic loads of the aforementioned character.

To a certain extent a better situation may be achieved, if load is transferred gradually onto the feet and joints. Such a state occurs, if one is running on a softer surface, e.g. on a carpet, fine grass.

Load acting on the foot, however, on the joints will be considerably influenced by the fact, which part of the sole and to which extent is partaking in the single phases of load transfer. From this point of view conditions approaching ideal can be observed, if we are going, running or walking on a soft sand, on bare feet and with different intensities.

Summing up what has been said, the less load will be exerted on the foot, joints and spinal column and muscles, respectively, if load is transferred onto the sole gradually and not in a shock-like manner and we provide for the fact that the possibly largest surface of the sole should receive the load and parts should be subjected to the load always in a proper time.

Unfortunately, we cannot chose quality of the soil we are walking or running on, accordingly, the construction of the footwear we are wearing must have a design which seems to be the most suitable for meeting said requirements. It can be stated that generally known footwears do not meet these requirements.

Footwears have been known with which the sole is made of some elastic material, e.g. rubber or some synthetic material. A sole made of such an elastic material is reducing the extent of shock-like load of the foot, however, the drawback of said design lies in that it does not accomodate properly to the shape of the sole surface. Footwears used to be produced in large series, having the character of mass production, so no possibility is given to assure

compliance with individual differences. Footwears used to be averaged on basis of serially taken measurements, it is impossible to consider further individual differences within a range of sizes having been gained by averaging in course of production on plant level.

It has been tried to prepare the sole-part of footwear from superimposed members built-together and laid on each other. Such a solution is described in the German Patent DE-AS 2 924 716. Single members are made of hard and/or flexible materials, or one of the parts may be arranged as an insole on the other one. Due to the considerable variety of human soles, the solution was unable to assure ideal position of the sole, as a consequence, the solution could not be applied in a wide circle.

Soles for footwears have been also known, with which a closed cavity is formed between two elastic materials and a fluidum is contained in said cavity.

An example for this solution is given in the Patent US-PS 4,342,157, specifying a hollow cavity in the sole. With this solution the cavity contains a cushion having been filled partly with a liquid. As a matter of fact this cushion is but a hose, having thin flexible and elastic, not-porous walls, which are accomodating to the sides of the cavity. So about 70 to 95 % of the cushion is filled with pressurized liquid, optionally gas under pressure may be introduced above the the liquid layer. The drawback of said solution lies in that walking becomes instable.

In the Patent US-PS 4,445,284 a shoe is specified, the sole-part of which contained elongated cells. The cells contain liquid, air or any other suitable fluidum, the flow is controlled by means of check-valves. In addition to the

complicated realization it shows the same deficiencies, as the previous one, wearing results in an unsure and wobbling walk.

The US-PS 4,472,890 describes a solution, with which the cavity formed in the shoe-sole receives a cushion filled partly with a liquid, the cushion is made of an elastic, non-porous material and has thin walls. The hose contains pressurized liquid. However, this solution is far better for transferring force effects, than the previous ones, one is confronted with difficulties in course of production and use, and these problems could not be solved up to now.

The British Patent GB-PS 1 525 476 specifies an insole, consisting of two parts made of some flexible material and inbetween there is some liquid, so e.g. water. The insole is divided into four parts separated from each other, the single fields do not communicate with each other. Pressure of water can be adjusted to the desired height. Problems are identical with the previously described ones.

The German Patent Specification DE-OS 2 809 011 describes sporting shoes provided with an air cell with a check-valve. In respect to the entirety of the sole surface the solution with the air cell cannot be considered as a solution of full value, deficiency does not need any explanation.

In the EPA-Patent 0 122 985 a shoe is specified which is crossed by a channel containing pressurized air; deficiency of the solution lies in that in respect to the entirety of the sole possibility of safe walking is not given.

Patent specifications US-PS 4,392,104 and US-PS 4,462,171 relate to footwears with double-walled sole. With both solutions there is air in the channels between the lower and upper sole-part, the pressure of air is regulated by means of valves. These solutions require most complicated conditions of manufacturing, they do not yield stability, sense of safety in course of moving, accordingly they did not spread in a wide circle.

Out of known footwear types the enumerated solutions approach more or less ideal support, however, they have several disadvantageous features preventing general application. A common deficiency lies in that the layer confining the cavity on the top is of the same thickness on the sole surface, elasticity does not meet requirements, it is unable to take up the shape of the sole-surface with the desired quickness and completely. Another deficiency lies in, in so far as surfacial parts of the two layers facing each other are sliding easily on one another on effect of sliding force components, as a consequence, the person using the footwear has the sence of uncertainity. Connection between the two layers having been fixed to each other gets torn after a short use, as the two layers lying on each other, sliding frequently and relatively to a large extent, are subjected to a considerable load, as a consequence glued material parts get torn apart. Now, if in this case air is used as fluidum, the mass of air under overpressure leaves the cavity. A further drawback lies in that on effect of increased load the air gets in a compressed state, frequently to such an extent that the aim set cannot be reached anymore.

A further common disadvantageous feature of the known footwears of the specified character lies in that

both in the loaded and unloaded state they hold the foot either too tightly or unmotivatedly loosely. In case of loose enclosure, mainly in course of sporting activities, the foot if not at all supported properly by the footwear and on the soil, while in a tight state the footwear strangles the arteries of the foot, even in an unloaded state. It can be considered as an ideal condition, if in the unloaded state blood circulation in the veins is unhindered, if work is performed, blood may circulate freely in the veins always, if e.g. the foot gets in an unloaded state in course of walking or running.

The aim of the invention is to develop a footwear, which enables that sole-surface of the foot should bear up against the sole-part of the footwear in an ideal way in course of load resp. use; the person wearing the shoe should always feel the stable support for the foot and the veins in the surrounding body parts might be compressed on the worst in the timely periods of loading.

Accordingly, the invention relates to a footwear having a sole-part made of an elastic material, formed as a double layer - a lower and an upper layer -, while between the two layers there is a space forming a cavity having been filled with a material of the liquid phase; the solution can be characterized in that the double sole of the footwear forms one single undivided closed space stretching oneself in the full length of the sole. At least one of the double layers is formed so, that on the points of force arising in course of static and/or dynamic loading of the sole of the foot - so in the enviroment of the heels, the striated musculature and expediently in the range of pad of the toes - there is a thickened and/or hardened layer, additionally, at least on a part or on the

whole of one of the double layers guide ribs and notches are formed promoting and/or inhibiting the flow of the enclosed inflexible material of liquid phase according to a predetermined systematical order.

With a preferred embodiment of the invention, with the footwear the guiding ribs and/or notches are curves recurring in itselves and/or labyrinth curves and/or any other deflecting means, wherein the mutual distance between the points of loading is the possibly less.

With a further preferable embodiment of the footwear according to the invention, if the liquid space of the footwear-sole having been formed as a double layer is connected with the doper part of the shoe, also formed with a double layer, expediently with the leg of the shoe.

It is considered as advantageous, if the closed space-part having been formed in the leg of the shoe is formed as a pipe system of channel system, separated partly or completely, communicates with the liquid space of the footwear-sole formed as a double layer.

It is also considered as advantageous, if the footwear according to the invention is formed so, that at least one of the double-layered sole of the footwear is interconnected partly or completely with an elastic synthetic material, eventually with closed cells, or with any similar material.

In accordance with the invention, a further embodiment of the footwear can be characterized in that the ribs formed on one of the soles of the footwear are realized so as to fit into the notches.

The embodiment is considered also as advantageous, with which the treading surface of the sole of the footwear is formed with some pattern, mainly on the points of loading, made of some wear-resistent material with holding ribs and adherent ribs being suitable to exert reactive forces against directions of force effects,.

At last, the embodiment is considered advantageous, with which the material of liquid phase used for this purpose is a fluidum of the density 0,5 to 2 g/cm^3, with a viscosity depending less on temperature, so e.g. silicone oil or a mixture thereof, or any other molecularly fluent substance.

The invention will be described in detail by means of preferred embodiments serving here as examples, by the aid of the drawings enclosed, wherein:

figure 1 gives the shematical corss-section,
figure 2 the cross-section of another embodiment,
figure 3 shematical cross-section of a further preferred embodiment,
figure 4 is also a cross-section, while
figures 5, 6 and 7 give examples of details being suitable to any of the embodiments of the invention.

As it is to be seen in figure 1, the sole 1 of the foot - wear consists of an upper layer 2 and a lower layer 3, made of any suitable felxible material, elastic synthetic material or rubber, or any other matieral with similar characteristics. The upper layer 2 and the lower layer 3 are fixed to each other - e.g. glued - in a way known in itself and so, that inbetween a closed cavity 4 is formed. Interconnection of the upper layer 2 and the lower layer 3 can be safely solved by using some body with a clamping character and in such a manner that it forms

a band 5 or any other similar device surrounding the whole periphery of the sole 1 of the footwear. The sole 1 of the footwear can be fixed to the upper parts if any known way.

The upper layer 2 confining a cavity 4 may be formed with a changing thickness longitudinally, optionally transversely too. On the lower parts of the toes and under the waist part the upper layer 2 is considerably thinner, than on the other parts. Expediently skiving of the upper layer 2 on the aforementioned places can be realized by forming notches 7, next to the notches 7 ribs 8 are to be found.

It goes without saying that the notches 7 do not extend to the edge of the upper layer 2 as to achieve that the edges of the upper layer 2 and lower layer 3 intended to be interconnected should bear up against each other with a smooth surface.

Cavity 4 contains a liquid with a viscosity being higher, than the viscosity of water, material depends less on changes in temperature and density equals to 0,5 to 2 g/cm^3, In such a manner e.g. silicone oil, the mixture thereof or any other substance being molecularly fluent can be used for this purpose. In case, if the footwear is in an unloaded state, the surface of the upper layer 2 covered with the insole-lining 9 is planar, while said planar surface is parallel with the surface formed with patterns, forming the treading surface of the lower layers 3. As soon as the footwear is loaded by the weight of the user, the upper part 2 moves toward the lower layer 3 and under the toes, in the part between the toe pads and the striated musculature, as well as under the heels it bears up against the lower layer 3, while the part of the upper layer 2 is bulging out upwards, namely the part lying under the toe

pads, striated musculature and the heels, respectively. As a consequence, in course of the motion of the upper layer 2 and the lower layer 3 towards each other the liquid having been distributed equally originally in the cavity 4 will be collected under the thinner parts of the upper layer 2 and presses these thin layers upwards. As a result the sole will be supported so as if we walked on a material of carpet - or sand character. In case, if in this state the shape of the foot changed while walking or running, simultaneously the shape of the upper layer 2 will change too and it fits completely to the sole-surface of the foot. When load is ceasing, the sole 1 of the footwear is taking up its original position.

Notches 7 may be straight or curved, or curves recurring in itselves, or labyrinth curves.

Referring to figure 2, the embodiment of the footwear to be seen here, differs in so far as from the embodiment according to figure 1, that on the inner surface of the lower layer 3 notches 7 and ribs 8 are formed. Said ribs 8 are expediently formed in the full length of the footwear and they have to fulfil a double task. One of the tasks lies in to prevent sliding of the two layers on one another, when the upper layer 2 is lying onto the lower layer 3 in the loaded state, under the effect of the force component transferred by the foot from the upper layer 2, being parallel with the longitudinal direction or cross-direction of the shoe. If along the periphery of the upper layer 2 and the lower layer 3 reinforcement, connection of the sole 1 of the footwear tore, cracked, slip may occur. The other task lies in that with equal thickness of the sole 1 of the footwear a larger mass of liquid could be arranged in the cavity 4, as the notches 7 between the ribs 8 are also storing the liquid.

With the embodiments as to be seen in figs. 1 and 2, notches 7 and ribs 8 in the upper layer 2 are arranged only in the part under the toes and the arch of the ankle.

With the embodiment according to figure 3 under the sole-lining 9 of the upper layer 2 profiles 7a are to be found, additionally, in the parts lying next to the tracts of the upper layer 2 containing the profiles 7a, on the part facing the closed cavity 4 notches 7 and ribs 8 are formed. Ribs 8 formed and enclosed by the notches 7 prevent sliding of the surfaces of the upper layer 2 and the lower layer 3 lying on each other.

With the embodiment as shown in figure 3, below the parts of the sole-surface of the foot, on which - in an unloaded state of the foot - the upper layer 2 is bearing up against the sole-lining 9, in the surface of the lower layer 3 profiles 10 are worked out, which enable that in course of the deformation of the upper layer 2 every single part of the material should be subjected to the stretching strain, as a consequence, the material part having been subjected to the largest strain will suffer a less elongation, than the embodiment according to figs. 1 and 2, that means that the material of the upper layer 2 is loaded proportionally with the stretching strain.

As it becomes obuvious form the embodiment according to figure 4, along the periphery of the cavity 4 openings 15 are formed, through which pipes 11 extend into the upper part 6 of the footwear and communicate with the cavity 4. Essentially the pipes 11 are arranged equally along the sole 1 of the footwear and the upper part 6, i.e. along their periphery. Pipes 11 are formed with elastic walls which stretch upon the increase of inner pressure. Optionally, pipes 11 may be interconnected by

horizontally arranged connecting pipes 12, accordingly, the cavity 4, the ascending pipes 11 and interconnecting pipes 12 form a continuous space which is completely filled with the liquid. Now, if upon the load transferred by the foot, the upper layer 2 of the sole 1 of the footwear approaches the lower layer 3, volume of the cavity 4 will be reduced, a part of the liquid flows from the cavity 4 into the pipes 11 and the interconnecting pipes 12, these are stretched, as a consequence, the upper part 6 will fit closer to the foot and ankle than before, the foot is supported in a safe way. As soon as load of the foot ceases, the cavity takes up repeatedly its original shape, the part of the liquid having been pressed into the pipes 11 and interconnecting pipes 12 flows back into the cavity 4, the upper part 6 encloses the foot and the ankle in a more loose way, as a consequence, blood can flow freely in the veins.

Figures 5, 6 and 7 illustrate the sectional veew of the sole-elements of the footwear. As it becomes obvious form the figures, holding rib 13 and adhering rib 14 are formed on the treading surface. The pattern changes in dependence of loading.

The advantages of the footwear according to the invention are, as follows:

In any mode of use the sole 1 of the footwear fits completely to the whole surface of the sole in any phase of use, it supports the foot equally, independently of the shape of the sole of the foot.

On the sole surface load increases for a certain period, starting form zero to the highest value, accordingly neither the foot, nor the ankle, knee, spinal column or the musculature will be subjected to shock-like loads being

harmful for the health. Single points of loading are regulated in dependence of the load applied. Rolling pressure distribution following the load is fully assured, flexibility of the sole of the footwear is well regulated.

An additional advantage lies in that the footwear encloses tightly the foot, ankle and leg, if these are subjected to load; in the unloaded state enclosing is loose, free flow of blood is prevented for a short time only. During the periods without intermediate load no loading occurs.

By using the incompressible liquid filling having a higher viscosity, than water, the person using the footwear has always the feeling that his foot is safely and steadily supported. The liquid filling does not tend to diffuse from the closed space or leave the cavity e.g. through the pores.

What we claim:

1. Footwear made of an elastic material having been formed with a double layer - an upper layer and a lower layer - forming the sole of the footwear, between the two layers there is a space forming a closed cavity which is filled with a material in the liquid phase, characterized in that the double sole (1) of the footwear forms a closed, not-divided cavity (4) extending in the full length of the sole, while at least one of the double layers has a thicker and/or harder layer on the points of force arising in course of the static and/or dynamic load of the sole of the foot, expediently in the enviroment of the heel, striated musculature and toe pads, additionally, at least on one of said double layers, partly or completely, there are deflecting ribs (8) and notches (7) promoting or preventing the flow of the enclosed inflexible material of liquid phase according to a predeterminated order.

2. Footwear as claimed in claim 1, characterized in that the ribs (8) and/or notches (7) arecurves recurring in themselves, and/or labyrinth curves or any other deflecting bodies, wherein mutual distance between the points of loading is the smallest.

3. Footwear as claimed in claim 1, characterizen in that the liquid space of the footwear sole (1) having been formed as a double layer, is connected with the upper part (6) of the footwear formed from a double layer too, at least on certain tracts of the shoe leg.

4. Footwear as claimed in claim 3, characterized in that in the upper parts (6) of the footwear completely or partly separated pipes (11) with elastic

walls, optionally interconnecting pipes (12) are communicating with the liquid space of the footwear sole (1) forming a system or a channes system.

5. Footwear as claimed in anyy of the claims 1-4, characterized in that at least one of the double-layered footwear sole (1) is connected partly or completely with an elastic material or synthetic material with closed cells or any other suitable material.

6. Footwear as claimed in any of the claims 1 to 5, characterized in that the ribs (8) having been formed on one of the soles of the footwear are fitting into the notches (7) on the other footwear sole (1).

7. Footwear as claimed in any of the claims 1 to 6, characterized in that the treading surface of the footwear sole (1) is formed with patterns known in itself or there are holding ribs (13) or adhering ribs (14) made of a wear-resistent material to exert reactive forces to wards the directions of force effect.

8. Footwear as claimed in any of the preceding claims, characterized in that the material of the liquid phase is a fluidum with a density of 0,5 to 2 g/cm^3, viscosity depends less on temperature, so e.g. silicone oil or the mixture thereof, or any other similar, molecularly fluent material can be used for this purpose.

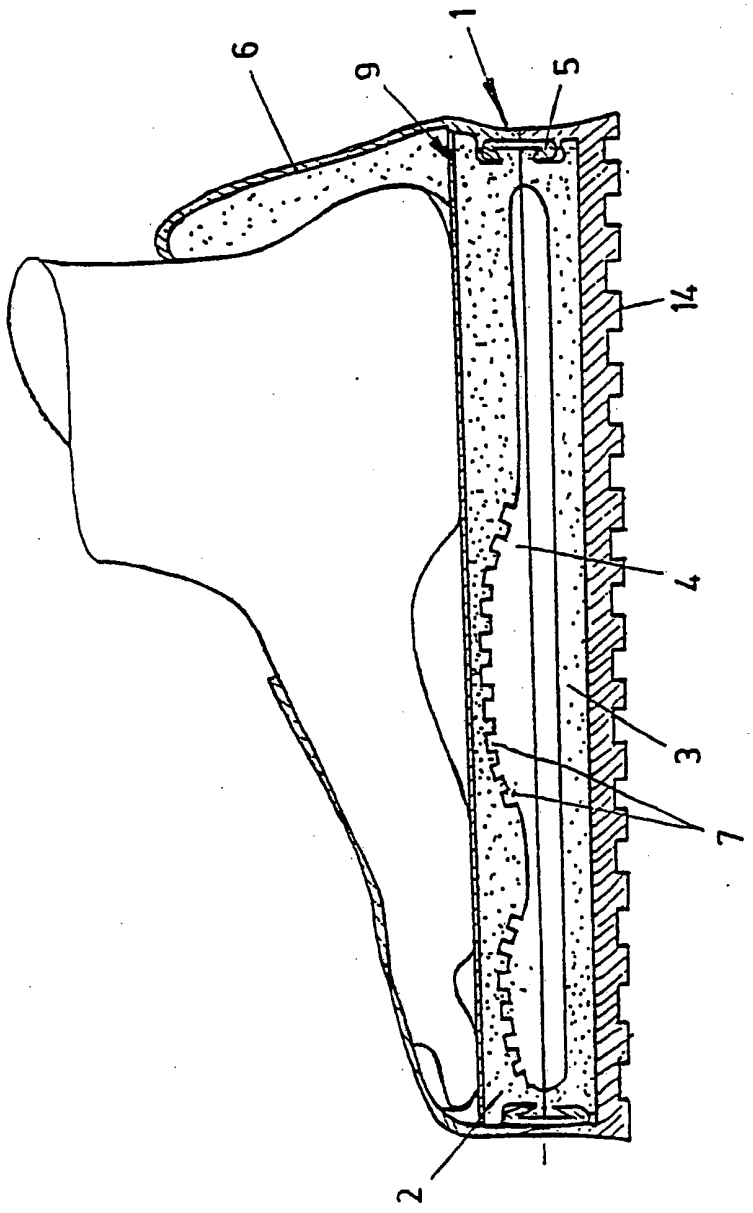


Fig. 1

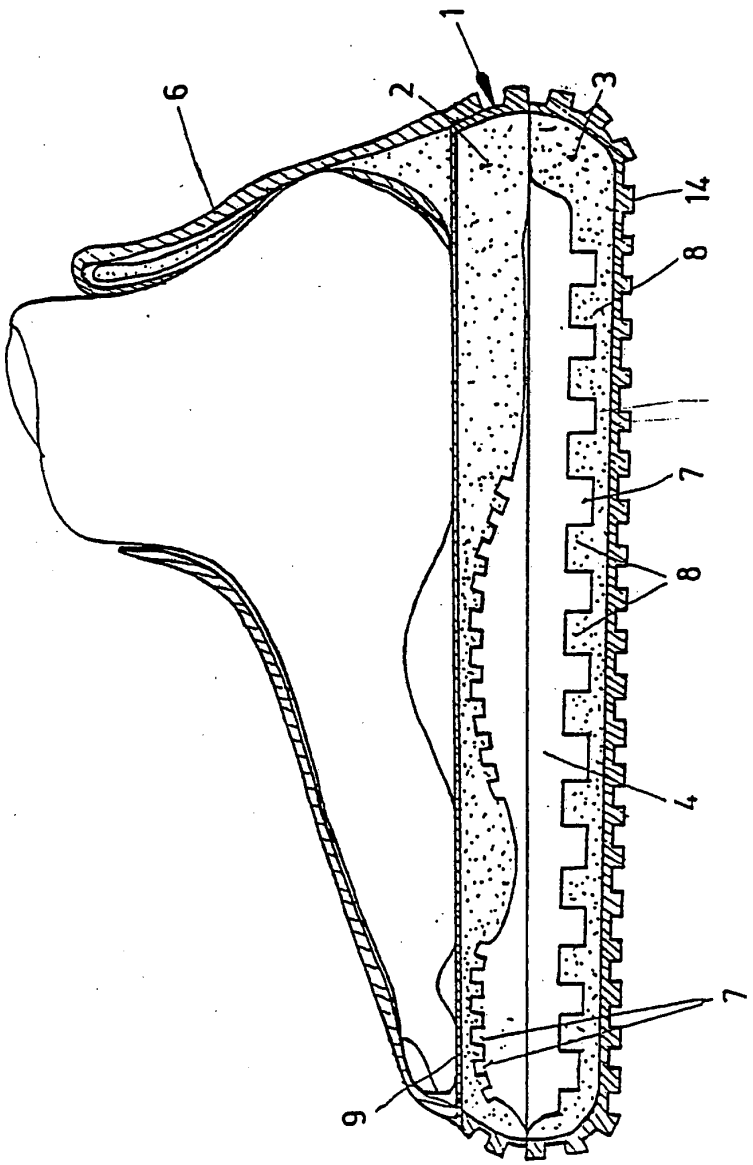


Fig. 2

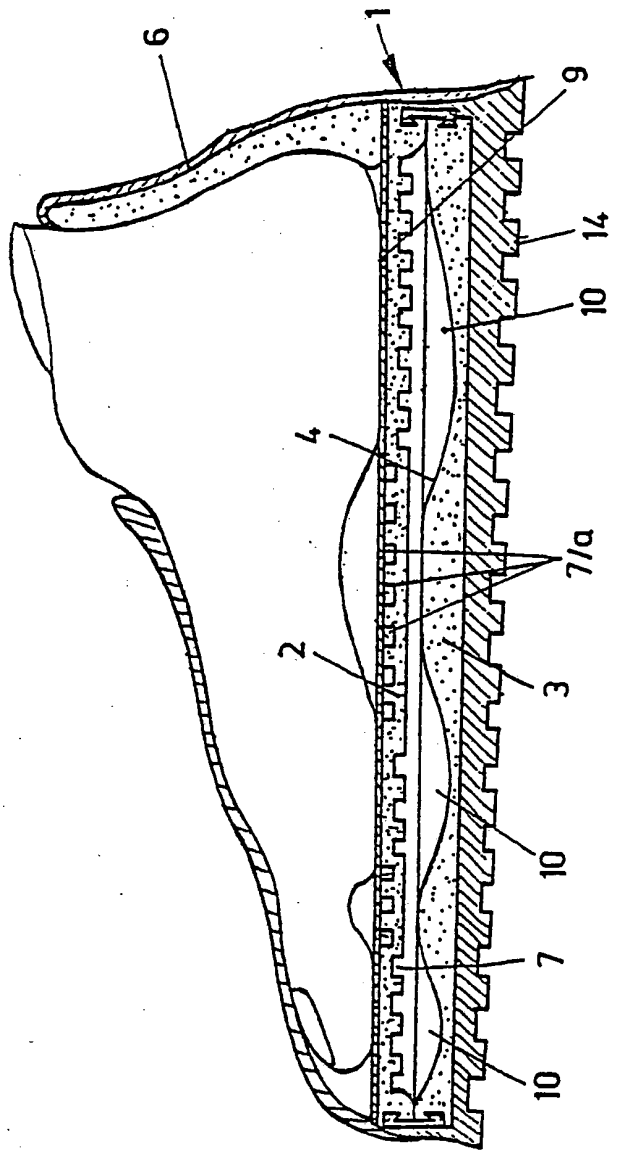


Fig.3

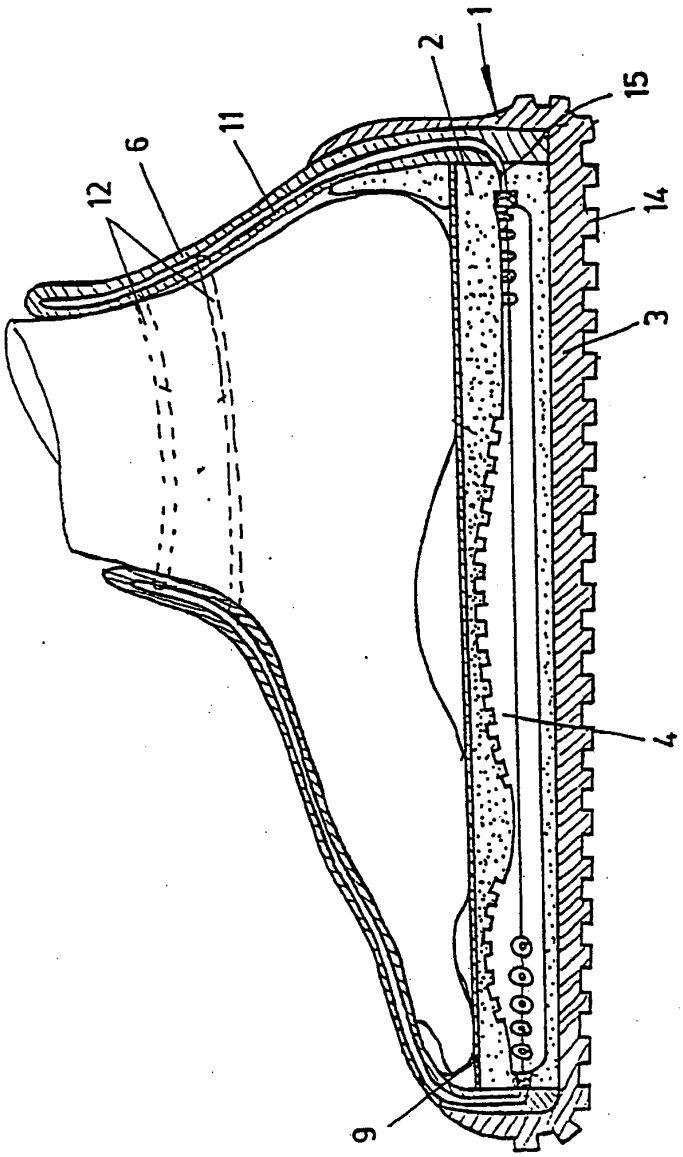


Fig. 4

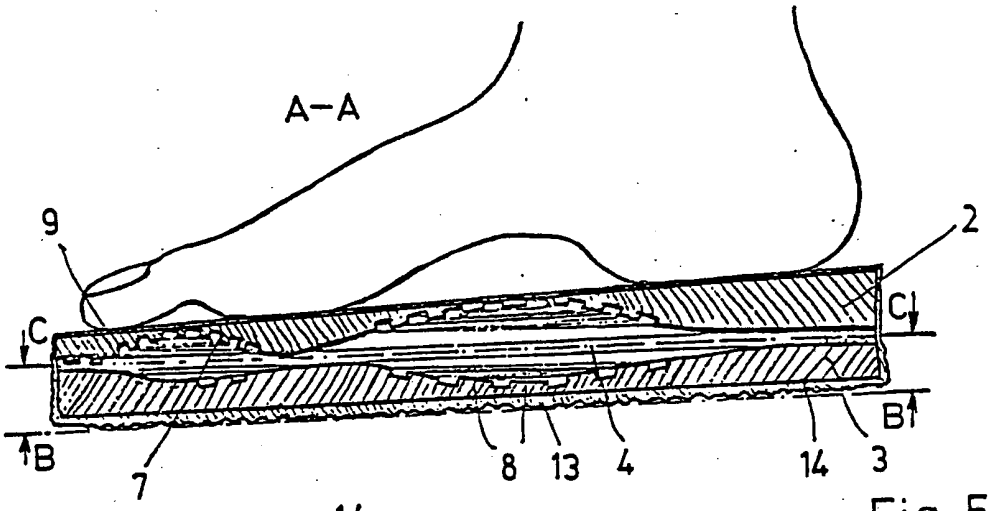


Fig.5

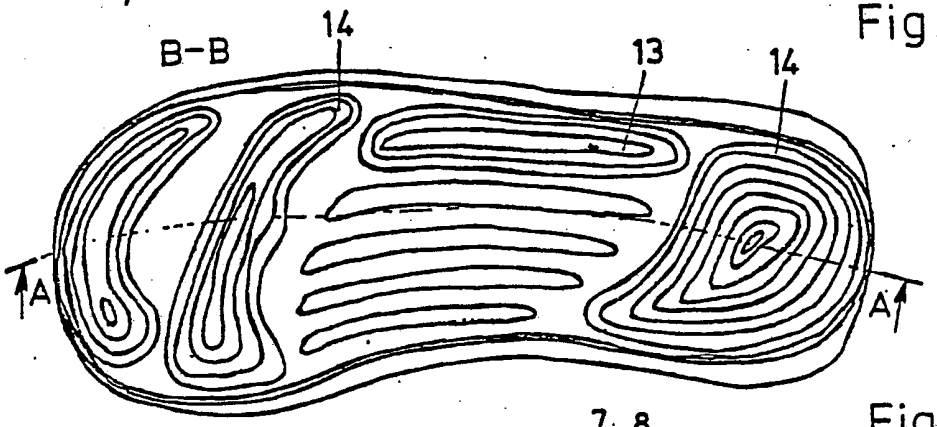


Fig.6

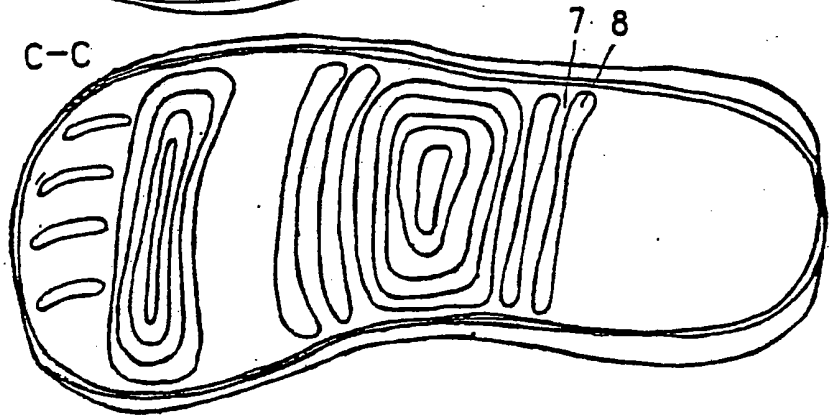


Fig.7

INTERNATIONAL SEARCH REPORT

International Application No PCT/HU 89/00032

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all) [6]

According to International Patent Classification (IPC) or to both National Classification and IPC

IPC[4]: A 43 B 13/20

II. FIELDS SEARCHED

Minimum Documentation Searched [7]

Classification System	Classification Symbols
Int.Cl.[4]:	A 43 B 7/06, 13/00, 13/12, 13/14, 13/16 , 13/20, 13/42

Documentation Searched other than Minimum Documentation to the Extent that such Documents are included in the Fields Searched [8]

III. DOCUMENTS CONSIDERED TO BE RELEVANT [9]

Category [10]	Citation of Document, [11] with indication, where appropriate, of the relevant passages [12]	Relevant to Claim No. [13]
Y	US, A, 3 608 215 (FUKUOKA) 28 September 1971 (28.09.71), see column 1, lines 25-48; claims; fig. 4,5,8,11,13.	(1,2)
A		(3,5,7)
Y	DE, A1, 3 701 826 (CHOW) 22 October 1987 (22.10.87), see claims 1,11; fig. 1,2,5,7,13.	(1,2)
A		(4)
Y	GB, A, 2 050 145 (BOLLA) 07 January 1981 (07.01.81).	(1,2)
A		(3,5)
Y	EP, A2, 0 062 622 (PETERSON) 13 October 1982 (13.10.82), see abstract; claims; fig. 1,2.	(1,2)
A		(7)
A	DE, A1, 2 709 478 (BIESTERFELD) 07 September 1978 (07.09.78).	(1,3,5)
A	US, A, 4 016 662 (THOMPSON) 12 April 1977 (12.04.77).	(1,3,4,5)

* Special categories of cited documents: [10]

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

IV. CERTIFICATION

Date of the Actual Completion of the International Search	Date of Mailing of this International Search Report
12 September 1989 (12.09.89)	14 September 1989 (14.09.89)
International Searching Authority	**Signature of Authorized Officer**
AUSTRIAN PATENT OFFICE	

Form PCT/ISA/210 (second sheet) (January 1986)

III. DOCUMENTS CONSIDERED TO BE RELEVANT (CONTINUED FROM THE SECOND SHEET)

Category *	Citation of Document, with indication, where appropriate, of the relevant passages	Relevant to Claim No
A	US, A, 4 223 455 (VERMEULEN) 23 September 1980 (23.09.80), see abstract; claims 1-3; fig. 4,6.	(1,6,7)

Anhang zum internationalen Recherchenbericht über die internationale Patentanmeldung Nr. PCT/HU 89/00032

In diesem Anhang sind die Mitglieder der Patentfamilien der im obengenannten internationalen Recherchenbericht angeführten Patentdokumente angegeben. Diese Angaben dienen nur zur Unterrichtung und erfolgen ohne Gewähr.

Annex to the International Search Report on International Patent Application No.

This Annex lists the patent family members relating to the patent documents cited in the above-mentioned International search report. The Austrian Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

Annexe au rapport de recherche internationale relatif à la demande de brevet international n°.

La présente annexe indique les membres de la famille de brevets relatifs aux documents de brevets cités dans le rapport de recherche internationale visé ci-dessus. Les renseignements fournis sont donnés à titre indicatif et n'engagent pas la responsabilité de l'Office autrichien des brevets.

Im Recherchenbericht angeführtes Patentdokument Patent document cited in search report Document de brevet cité dans le rapport de recherche	Datum der Veröffentlichung Publication date Date de publication	Mitglied(er) der Patentfamilie Patent family member(s) Membre(s) de la famille de brevets	Datum der Veröffentlichung Publication date Date de publication
US-A - 3608215	28-09-71	BR-A0- 6914699	11-01-73
		BR-A0- 6914699	12-04-73
		DE-A - 2016119	27-01-72
		FR-A5- 2052268	09-04-71
		GB-A - 1278989	21-06-72
		GB-A - 1278990	21-06-72
		AT-B - 313924	11-03-74
		BE-A1- 750324	16-10-70
		CH-A - 537957	31-07-73
		GB-A - 1289223	13-09-72
		JP-B4-49049038	25-12-74
		US-A - 3671279	20-06-72
		US-A - 3836336	17-09-74
		JP-B4-50011600	02-05-75
		US-A - 3755422	28-08-73
		FR-A5- 2047724	12-03-71
		JP-B4-49045799	06-12-74
		US-A - 3755422	28-08-73
DE-A1- 3701826	22-10-87	JP-A2-62214701	21-09-87
		AU-A1-70191/87	22-10-87
		BR-A - 8702190	17-02-88
		CN-A -87104161	30-12-87
		FR-A1- 2597308	23-10-87
		GB-A0- 8705762	15-04-87
		GB-A1- 2189679	04-11-87
		NL-A - 8700694	16-11-87
		SE-A0- 8701545	14-04-87
		SE-A - 8701545	17-10-87
		JP-A2-63102701	07-05-88

See page -2-

GB-A1- 2050145	07-01-81	BE-A1- 880519	01-04-80
		DE-U1- 7934982	24-04-80
		FR-A1- 2458239	02-01-81
		FR-B3- 2458239	03-09-82
		NL-A - 8003232	09-12-80
		PT-A - 71360	01-06-80
EP-A2- 62622	13-10-82	AT-E - 31381	15-01-88
		EP-A3- 62622	10-11-82
		EP-B1- 62622	16-12-87
		DK-A - 1319/82	03-10-82
		FI-AO- 821012	23-03-82
		FI-A - 821012	03-10-82
		FI-B - 75089	29-01-88
		FI-C - 75089	09-05-88
		JP-A2-57177703	01-11-82
		KR-B1- 8801446	10-08-88
		NO-A - 820989	04-10-82
		SE-A - 8102124	03-10-82
		US-A - 4458430	10-07-84
DE-A1- 2709478	07-09-78	None	
US-A - 4016662	12-04-77	None	
US-A - 4223455	23-09-80	CA-A1- 1084260	26-08-80

For more details about this annex: see Official Journal of the European Patent Office, No. 12/82.